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**DATA PROCESSING METHOD AND SYSTEM FOR
PROCESSING AND MANAGING REPETITIVE MOTION
DATA BETWEEN DIVERSE GEOGRAPHIC LOCATIONS**

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CROSS-REFERENCES TO RELATED APPLICATIONS

- 5 This application is a continuation-in-part of co-
pending U.S. Patent Application Serial No. 09/957,223,
entitled "REPETITIVE MOTION FEEDBACK SYSTEM AND METHOD OF
PRACTICING A REPETITIVE MOTION", filed on September 20,
2001, on behalf of Evensen et al. (Attorney Docket
10 No. DYGI-30021), hereinafter referred to as the '223
application.

BACKGROUND

- 15 Numerous and varied methods and systems have been
developed for practicing repetitive motions executed by
an individual (i.e., a person or user), particularly
those motions used for sports, recreational or athletic
activities, such as golf or tennis. Such methods and
systems typically focus on one particular aspect of the
repetitive motion, such as the grip, position, or
20 orientation of the individual's head or body, or the
position or orientation of the device or instrument being
held or moved by the individual during the repetitive
motion. In many cases, a practice device is employed
that secures to the individual or the object moved by the

individual to restrict or limit the ability to make undesirable movements. Many of these devices are used only during practice and would not otherwise be used during normal play or performance of the repetitive motion. Additionally, such devices are often cumbersome and difficult to use, making them undesirable.

Despite the many devices and methods that have been developed, one of the best methods of practicing repetitive movements merely involves the use of a coach or professional instructor who actually observes the individual or student during practice of the repetitive motion. After observation of the individual, the instructor can provide feedback to the individual regarding their performance and communicate ways to improve upon the individual's performance.

The use of an instructor has obvious limitations, however. The time and attention an instructor can give may be limited, particularly if there is more than one student that must be observed during a particular practice session. And even if private or one-on-one instruction is used, seldom will an instructor be available to supervise all of the individual's practice sessions or be able to fully observe each and every repetitive motion performed by the individual during the practice session. Furthermore, an instructor may not be able to monitor each and every aspect of the individual's performance, particularly those aspects that are not easily monitored by merely observing the individual perform the repetitive motion. Another limitation is that for many, particularly for private or one-on-one-

type instruction, hiring a professional instructor can be expensive or even cost prohibitive.

Visual recording or videotaping of the repetitive motion sequence for post-analysis by the individual or an instructor has also been used as a practicing aid. Although, this may be beneficial, it does not provide immediate feedback to allow the individual to adjust his or her performance accordingly during the practice session. Further, unless the individual is quite knowledgeable of the mechanics of a properly executed motion sequence, little benefit may be derived from such method without involvement of a coach or instructor who can point out the proper or improper aspects of the recorded motion sequence.

What is therefore needed is a method and a system for practicing repetitive motions that overcome many of the shortcomings of the aforementioned prior art methods.

SUMMARY

The present invention, accordingly, provides a data processing method and a system for managing data describing each of a plurality of repetitive motions executed by a plurality of individuals at a plurality of bay stations located at a plurality of locations. The data is received by a data processing system via a communications network from each bay station, and is recorded in a data storage device. A request is received by the data processing system via the network from a requester at a terminal for a selected portion of the data, and the selected portion of the data is retrieved

and transmitted via the network to the requester at the terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

5 For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a high-level conceptual block diagram
10 illustrating a communications network interconnecting components embodying features of the present invention;

FIGURE 2 is a schematic diagram which exemplifies a network computer which may be used to implement the network of FIG. 1;

15 FIGURE 3 is a schematic diagram of a membership card which may be used by a member participating in the system of FIG. 1;

FIGURE 4 is a high-level state diagram which depicts the operation of the system of FIG. 1;

20 FIGURES 5A-5D are a flow chart which depicts control logic utilized by a software program in the computer of FIG. 2 to implement the state diagram of FIG. 4;

FIGURE 6 is a flow chart illustrating control logic effective for enabling the network computer to acquire
25 data describing a repetitive motion of a member;

FIGURE 7 is a flow chart illustrating control logic effective for enabling a member to access from the network computer data describing a repetitive motion of a member;

FIGURE 8 is a flow chart illustrating control logic effective for enabling a model repetitive motion to be designated as a repetitive motion template of a member;

5 FIGURE 9 is a flow chart illustrating control logic effective for enabling a member to remotely instruct the network computer to retrieve data describing a member's template repetitive motion;

10 FIGURE 10 is a flow chart illustrating control logic effective for enabling preferences to be entered for controlling the type of feedback a member receives when he practices repetitive motions;

15 FIGURE 11 flow charts illustrating control logic for generating and using statistical data from the data generated by members at bay stations to recommend equipment for members to use;

FIGURE 12 is a flow chart illustrating control logic for enabling members to compete with each other to determine which member practices closest to his/her repetitive motion template;

20 FIGURE 13 is a flow chart illustrating control logic for enabling members to compete with each other to determine which member improves the most;

25 FIGURE 14 is a flow chart illustrating control logic for enabling members to compete with each other to determine which member is most consistent in a repetitive motion;

FIGURE 15 is a flow chart illustrating control logic for enabling members to conduct a virtual competition with each other;

FIGURE 16 is a flow chart illustrating control logic for enabling instructors to review repetitive motions practiced by members;

FIGURE 17 is a flow chart illustrating control logic for instructors to determine their compensation; and

FIGURE 18 is a flow chart illustrating control logic for generating statistical data from the data generated by members at bay stations, for use by manufacturers.

DETAILED DESCRIPTION

In the following discussion, numerous specific details are set forth to provide a thorough understanding of the present invention. However, it will be obvious to those skilled in the art that the present invention may be practiced without such specific details. In other instances, well-known elements have been illustrated in schematic or block diagram form in order not to obscure the present invention in unnecessary detail. Additionally, for the most part, details concerning computers, networks, and the like have been omitted inasmuch as such details are not considered necessary to obtain a complete understanding of the present invention, and are considered to be within the skills of persons of ordinary skill in the relevant art.

It is noted that, unless indicated otherwise, all functions described herein are performed by a processor such as a computer or electronic data processor in accordance with code such as computer program code, software, integrated circuits, and/or the like that are coded to perform such functions. Furthermore, it is considered that the design, development, and

implementation details of all such code would be apparent to a person having ordinary skill in the art based upon a review of the present description of the invention.

It is further noted that the term "member" as used herein is understood to refer to an individual person, or the like, that engages or interacts with the present invention. Such member would preferably be a member of a business entity, such as a franchise or a club managed and operated by a franchise, which would establish, operate, and maintain the method and system of the present invention as described herein.

Referring to FIGURE 1 of the drawings, the reference numeral 100 generally designates a network system embodying features of the present invention. The system 100 includes a wireline and/or wireless communication network 102, such as the Internet, an intranet, a local area network (LAN), a wide area network (WAN), T1 lines, satellites, or the like, or any combination thereof, effective for providing data communication between computers. As described in further detail below, connected to the network 102 is a data processing system, also referred to herein as a network server or network computer, 104, a number of bay stations 106. A number of members 110, instructors 111, and authorized persons 130 are also connected to the network 102 by way of remote terminals or computers 122, 123, and 131, respectively, operable by the members 110, instructors 111, and authorized persons 130 (collectively referred to herein as "users 110, 111, and 130" or "user 110, 111, or 130").

Each bay station 106 includes a computer 114, to which are connected a card reader 116, at least one input

device 118, and at least one output device 120. Each computer 114 is preferably connected to the network 102 for data communication with the network computer 104. The card reader 116 may be any conventional card reader, such as a magnetic code reader, bar code scanner, or the like, effective for reading data imprinted on user cards 124, 125, and 132, described further below with respect to FIG. 3. The computers 114 may be conventional computers, and are described in further detail in the co-pending '223 patent application.

Each of the bay stations 106 are configured for electronically monitoring a repetitive motion (wherein the term "repetitive motion" is used herein to include practice motions and sequences of repetitive motions), executed by a member 110, and for generating data describing or representing the repetitive motion, as described in further detail in the co-pending '223 patent application. The generated data may include a video recording, three dimensional (3D) motion, laser monitored motion, weight shift patterns, and the like. The generated data is collected via the at least one input device 118 and recorded in the computer 114. The computer 114 is provided with software (not shown) configured for processing the data, and for generating to the at least one output device 120, substantially instantly upon completion of the motion, feedback to the member 110 who generated the motion. The at least one output device 120 may be any device effective for providing visual, audible, and/or electronic feedback, such as, for example, a monitor, speaker, printer, compact disc recorder, video recorder, and/or the like.

The computer 114 is connected for transmitting the generated data (preferably unprocessed) via the network 102 to the network computer 104 for storage in a data storage device (described below).

5 A number, such as six or twelve, of the stations 106 are preferably grouped together at a site where repetitive motions are conventionally practiced, such as at a golf course. The computers 114 of the stations 106, which are grouped together at a site, may optionally be
10 electronically connected together via a LAN computer (not shown), for backup recording of data, for the transmission of data from the computers 114 to the network computer 104 via the network 102, and the like. Furthermore, multiple sites, which are preferably
15 geographically separated, for example, in different cities or countries, or by a distance of more than a mile, are preferably each provided with one or more such groups of stations 106.

20 It is understood that the stations 106 may be used for many purposes such as, for example, practicing and developing repetitive motions or, as described further below with respect to FIGS. 12-15, facilitating repetitive motion competitions between members 110 at bay stations 106 located at a common site or different sites.
25 The structure and operation of the individual stations 106 are described in further detail in the '223 co-pending patent application, is incorporated herein in its entirety by reference, and is, therefore, not described in further detail herein, except to the extent necessary
30 to understand the present invention.

Each of the aforementioned groups of stations 106 is preferably owned and operated as a business entity, such as a modified franchise, wherein a franchise lessee leases space from a lessor, for a percentage of point-of-purchase revenues, space on site where such repetitive motions are practiced. In exchange for a fee and/or revenues from the lessor, the franchise provides facilities and equipment necessary for monitoring a member's repetitive motion in accordance with the present invention. As discussed further below, the franchise may optionally also be structured to receive and compile data from the plurality of stations 106, and to make such data available to manufacturers in exchange for compensation, such as monetary funds, so that improved accessories, apparel, equipment, balls, and the like, used in executing repetitive motions may be made available to members 110 as well as non-members. The franchise structure would also facilitate virtual tournaments, competitions, and games between members that may be geographically separated by relatively great distances, such as would be the case with members in different cities, states, or even different countries. Monetary proceeds from virtual tournaments, competitions, and games between members would preferably be apportioned equally between franchise lessors, or alternatively, such monetary proceeds may be distributed unequally based, for example, on the number of stations that a lessor supports.

Each member 110 preferably possesses, or has access to, a remote terminal, or computer, 122, such as a personal computer (PC), laptop computer, personal digital

assistant (PDA), kiosk, and/or the like, which is connected to the network 102 for data communication with the network computer 104. The computer 122 is preferably provided with a suitable graphical user interface (GUI) standalone software program configured for enabling it to interface with the network computer 104, and process and save data it receives from the network computer 104. Alternatively, the computer 122 may interface with the network computer 104 through a conventional web page supported by the network computer 104 using conventional techniques. The computer 122 may include output devices such as monitors, printers, CD recorders, and the like. The remote terminals, or computers, 122 may be located anywhere there is a connection to the network 102, such as, but not limited to, a member's home residence. As used herein with respect to remote terminals, the term "remote" means that the terminal or computer is not located on the premises of a bay station 106 at which the member is located.

Each instructor 111 or authorized person 130, also, preferably possesses, or has access to, a computer 123 or 131, such as a PC, laptop computer, PDA, kiosk, and/or the like, which is connected to the network 102 for data communication with the network computer 104. The computers 123 and 131 are preferably provided with a suitable graphical user interface (GUI) standalone software program configured for enabling it to interface with the network computer 104, and process and save data it receives from the network computer 104. The computers 123 and 131, however, may be located either on or off the premises of a bay station 106. The computers 123 and 131

may include output devices such as monitors, printers, CD recorders, and the like.

Each user 110, 111, and 131 is preferably also provided with a user account number, or personal identification number (PIN), for accessing the network computer 104. Such PIN is preferably embedded onto a card, such as a member card 124 of a respective member 110, an instructor card 125 of a respective instructor, or an authorized person card 132 of a respective authorized person, in both human-readable and machine-readable format, as described in further detail with respect to FIG. 3. Upon entry of the PIN through a computer 114, 122, 123, or 131 and network 102 to the network computer 104, a user 110, 111, or 130 acting as a "requester," may request data from the computer 104, such requesters including, by way of example, the member who executed the repetitive motions represented by the data being requested, an instructor responsible for instructing the member who executed the repetitive motions represented by the data being requested, and/or an authorized person who 130 has permission to access the data.

FIGURE 2 is a schematic diagram depicting aspects of the network computer 104. As shown therein, the computer 104 includes at least one conventional processor 200 (also referred to as a central processing unit (CPU) or arithmetic logic unit (ALU)), adapted for processing data received from the network 102, for storing such data in records of a database, executing processes comprising application programs effective for managing database

operations and other computers on the network 102, and the like.

A memory, or data storage device, 202, is operably connected to the processor 200. The data storage device
5 may be a semiconductor, magnetic, or optical memory device, and may include, but is not limited to, such devices as random access memory (RAM), floppy disks, fixed or hard disks, optical discs (e.g., CDs and DVDs), magnetic tapes, and the like, effective for storing data
10 in a manner that is well known to those skilled in the art. Data may be collected and stored continuously or, alternatively, only selected data may be stored during a practice session or performance of a repetitive motion sequence. The selected data may be stored or saved at
15 the direction of the individual or an observer or instructor or upon the occurrence of an event, such as a particular monitored event.

As discussed in further detail below, the memory 202 is preferably apportioned between at least one executable
20 program 204, a database 206, a state register 208, and an event register 210. While not shown, the database 206 may, optionally, be further apportioned between a index database and a raw data database. Such index database would store data relating to a particular repetitive
25 motion, such as the name of the member that executed the motion, the bay the motion was executed in, the date and time the motion was executed. The raw data database would store information pertaining to data actually describing or representing the motion indexed in the
30 index database. The data in the raw data database would be accessible by members, instructors, administrators,

and manufacturers and could be used when conducting repetitive motion competitions.

5 A conventional interface 212 is connected to the processor 200 for providing an interface between the processor 200 and the network 102. The computer 104 may constitute a network server computer, and may be used to maintain a web page (not shown) through the network 102 for members and/or instructors to access selected data and information.

10 Referring to FIGURE 3, a member card 124 is exemplified as preferably containing a machine-readable code 302 representing a PIN of the card holder member, the PIN being imprinted on the card in a conventional format, such as bar code, magnetic code, or the like,
15 which is readable by a card reader 116. The member card 124 preferably also includes, imprinted in human-readable format at two fields 304 and 306 on the card, the name and PIN, respectively, of the member. Optionally, the card 124 may also include an expiration date (not shown),
20 beyond which date the member card 124 is invalid. Each instructor 111 and authorized person 130 is provided with a card 125 and 132, respectively, which is substantially similar to the member card 124.

FIGURE 4 shows a representative high-level state
25 diagram 400 which depicts states through which an individual person may pass during and subsequent to becoming a registered person, such as a member 110, instructor 111, or authorized person 130, of the aforementioned organization implementing the present
30 invention, in accordance with one preferred embodiment of the present invention. While described herein with

respect to an individual member 110, the states depicted in FIG. 4 may be experienced by each of any number of users 110, 111, or 130.

As shown in FIG. 4 and described in further detail below, an individual who is not a member may pass through a *MEMBERSHIP-REGISTRATION* state 402, wherein the individual acquires membership in the organization, an *ACTIVITY* state 404 in which a member 110 may engage in a number of different transactional activities, and a *MEMBERSHIP-TERMINATION* state 406 in which the member's membership is terminated. As will be described in greater detail below, during the *ACTIVITIES* state 404, each of at least twelve activities may be performed any number of times, in any sequence, and are tabulated as follows, in no particular sequence:

Ref.	Fig.	State
408	6	<i>DATA-ACQUISITION</i>
410	7	<i>DATA-ACCESS</i>
412	8	<i>TEMPLATE-DESIGNATION</i>
414	9	<i>REMOTE-DELTA-COMPARE</i>
416	10	<i>FEEDBACK-PROFILE</i>
418	11	<i>MEMBER-EQMT-RECOMMENDATION</i>
420	12	<i>LEAST-DELTA-COMPETITION</i>
422	13	<i>IMPROVEMENT-COMPETITION</i>
424	14	<i>CONSISTENCY-COMPETITION</i>
426	15	<i>VIRTUAL-COMPETITION</i>

428	16-17	<i>INSTRUCTOR-DATA-SALES</i>
430	18	<i>EQMT-MFR-DATA</i>

FIGURES 5A-5D illustrate a representative high-level flowchart 500 of control logic utilized by the executable program 204 (FIG. 2) for implementing the state diagram 400 shown in FIG. 4, with respect to one user 110, 111, or 130 in accordance with a preferred embodiment of the present invention. The control logic is initiated by interrupt requests (IRQs) and conventional Internet web page technology, well-known in the art and, therefore, not discussed in further detail herein. It is noted that, as used in FIGURES 4-5D, the term "state" includes events which may occur during a state, and/or trigger the beginning and/or end of a state, for which events the event register 210 would be utilized in a manner well-known in the art.

In FIGURE 5A, execution of the program 204 is initiated in step 501 and proceeds to step 502 wherein a determination is made whether the state register 208 or event register 210 is set to the *REGISTRATION-INITIATION* state or to an event therein. If it is determined that the register 208 or 210 is set to the *REGISTRATION-INITIATION* state or event, then execution enters the *REGISTRATION-INITIATION* state 402, wherein conventional events (not shown), such as completing membership, instructor, or authorized person application forms and paying membership fees, are executed. Upon completion of events constituting the *REGISTRATION-INITIATION* state 402, execution proceeds to step 508. If, in step 502, it

is determined that the register 208 or 210 is not set to the *REGISTRATION-INITIATION* state or event, then execution proceeds directly to step 508.

In step 508, a determination is made whether the state register 208 or event register 210 is set to the *DATA-ACQUISITION-TX* state or to an event therein. If it is determined that the register 208 or 210 is set to the *DATA-ACQUISITION-TX* state or to an event therein, then execution enters the *DATA-ACQUISITION-TX* state 408, described in further detail below with respect to FIG. 6. Upon completion of events constituting the *DATA-ACQUISITION-TX* state 408, execution proceeds to step 510. If, in step 508, it is determined that the register 208 or 210 is not set to the *DATA-ACQUISITION-TX* state or to an event therein, then execution proceeds directly to step 510.

In step 510, a determination is made whether the state register 208 or event register 210 is set to the *DATA-ACCESS* state or to an event therein. If it is determined that the register 208 or 210 is set to the *DATA-ACCESS* state or to an event therein, then execution enters the *DATA-ACCESS* state 410, described in further detail below with respect to FIG. 7. Upon completion of events constituting the *DATA-ACCESS* state 410, execution proceeds to step 512. If, in step 510, it is determined that the register 208 or 210 is not set to the *DATA-ACCESS* state or to an event therein, then execution proceeds directly to step 512.

In step 512, a determination is made whether the state register 208 or event register 210 is set to the *TEMPLATE-DESIGNATION* state or to an event therein. If it

is determined that the register 208 or 210 is set to the *TEMPLATE-DESIGNATION* state or to an event therein, then execution enters the *TEMPLATE-DESIGNATION* state 412, described in further detail below with respect to FIG. 8.

5 Upon completion of events constituting the *TEMPLATE-DESIGNATION* state 412, execution proceeds to step 514. If, in step 512, it is determined that the register 208 or 210 is not set to the *TEMPLATE-DESIGNATION* state or to an event therein, then execution proceeds directly to
10 step 514.

With reference to FIG. 5B, in step 514, a determination is made whether the state register 208 or event register 210 is set to the *REMOTE-DELTA-COMPARE* state or to an event therein. If it is determined that
15 the register 208 or 210 is set to the *REMOTE-DELTA-COMPARE* state or to an event therein, then execution enters the *REMOTE-DELTA-COMPARE* state 414, described in further detail below with respect to FIG. 9. Upon completion of events constituting the *REMOTE-DELTA-*
20 *COMPARE* state 414, execution proceeds to step 516. If, in step 514, it is determined that the register 208 or 210 is not set to the *REMOTE-DELTA-COMPARE* state or to an event therein, then execution proceeds directly to step 516.

25 In step 516, a determination is made whether the state register 208 or event register 210 is set to the *FEEDBACK-PROFILE* state or to an event therein. If it is determined that the register 208 or 210 is set to the *FEEDBACK-PROFILE* state or to an event therein, then
30 execution enters the *FEEDBACK-PROFILE* state 416, described in further detail below with respect to FIG.

10. Upon completion of events constituting the *FEEDBACK-PROFILE* state 416, execution proceeds to step 518. If, in step 516, it is determined that the register 208 or 210 is not set to the *FEEDBACK-PROFILE* state or to an event therein, then execution proceeds directly to step 518.

In step 518, a determination is made whether the state register 208 or event register 210 is set to the *MEMBER-EQMT-RECOMMENDATION* state or to an event therein. If it is determined that the register 208 or 210 is set to the *MEMBER-EQMT-RECOMMENDATION* state or to an event therein, then execution enters the *MEMBER-EQMT-RECOMMENDATION* state 418, described in further detail below with respect to FIG. 11. Upon completion of events constituting the *MEMBER-EQMT-RECOMMENDATION* state 418, execution proceeds to step 520. If, in step 518, it is determined that the register 208 or 210 is not set to the *MEMBER-EQMT-RECOMMENDATION* state or to an event therein, then execution proceeds directly to step 520.

In step 520, a determination is made whether the state register 208 or event register 210 is set to the *LEAST-DELTA-COMPETITION* state or to an event therein. If it is determined that the register 208 or 210 is set to the *LEAST-DELTA-COMPETITION* state or to an event therein, then execution enters the *LEAST-DELTA-COMPETITION* state 420, described in further detail below with respect to FIG. 12. Upon completion of events constituting the *LEAST-DELTA-COMPETITION* state 420, execution proceeds to step 522. If, in step 520, it is determined that the register 208 or 210 is not set to the *LEAST-DELTA-*

COMPETITION state or to an event therein, then execution proceeds directly to step 522.

In step 522, a determination is made whether the state register 208 or event register 210 is set to the
5 *IMPROVEMENT-COMPETITION* state or to an event therein. If it is determined that the register 208 or 210 is set to the *IMPROVEMENT-COMPETITION* state or to an event therein, then execution enters the *IMPROVEMENT-COMPETITION* state 422, described in further detail below with respect to
10 FIG. 13. Upon completion of events constituting the *IMPROVEMENT-COMPETITION* state 422, execution proceeds to step 524. If, in step 522, it is determined that the register 208 or 210 is not set to the *IMPROVEMENT-COMPETITION* state or to an event therein, then execution
15 proceeds directly to step 524.

With reference to FIG. 5C, in step 524, a determination is made whether the state register 208 or event register 210 is set to the *CONSISTENCY-COMPETITION* state or to an event therein. If it is determined that
20 the register 208 or 210 is set to the *CONSISTENCY-COMPETITION* state or to an event therein, then execution enters the *CONSISTENCY-COMPETITION* state 424, described in further detail below with respect to FIG. 14. Upon completion of events constituting the *CONSISTENCY-*
25 *COMPETITION* state 424, execution proceeds to step 526. If, in step 524, it is determined that the register 208 or 210 is not set to the *CONSISTENCY-COMPETITION* state or to an event therein, then execution proceeds directly to step 526.

30 In step 526, a determination is made whether the state register 208 or event register 210 is set to the

VIRTUAL-COMPETITION state or to an event therein. If it is determined that the register 208 or 210 is set to the *VIRTUAL-COMPETITION* state or to an event therein, then execution enters the *VIRTUAL-COMPETITION* state 426, described in further detail below with respect to FIG. 5 15. Upon completion of events constituting the *VIRTUAL-COMPETITION* state 426, execution proceeds to step 527. If, in step 526, it is determined that the register 208 or 210 is not set to the *VIRTUAL-COMPETITION* state or to an event therein, then execution proceeds directly to step 527. 10

In step 527, a determination is made whether the state register 208 or event register 210 is set to the *INSTRUCTOR-DATA* state or to an event therein. If it is determined that the register 208 or 210 is set to the *INSTRUCTOR-DATA* state or to an event therein, then execution proceeds to step 528 wherein a determination is made whether the user or person requesting the instructor data is authorized to access such data. If a determination is made that such user or person is authorized to access such data, then execution enters the *INSTRUCTOR-DATA* state 428, described in further detail below with respect to FIGS. 16-17. Upon completion of events constituting the *INSTRUCTOR-DATA* state 428, execution proceeds to step 530. If, in steps 527 or 528, it is determined that the register 208 or 210 is not set to the *INSTRUCTOR-DATA* state or to an event therein or that access is not authorized, then execution proceeds directly to step 529. 20 25

With reference to FIG. 5D, in step 529, a determination is made whether the state register 208 or 30

event register 210 is set to the *EQMT-MFR-DATA* state or to an event therein. If it is determined that the register 208 or 210 is set to the *EQMT-MFR-DATA* state or to an event therein, then execution proceeds to step 530 wherein a determination is made whether the user or person requesting the equipment-manufacturer data is authorized to access such data. If a determination is made that such user or person is authorized to access such data, then execution enters the *EQMT-MFR-DATA* state 430, described in further detail below with respect to FIG. 18. Upon completion of events constituting the *EQMT-MFR-DATA* state 430, execution proceeds to step 532. If, in steps 529 or 530, it is determined that the register 208 or 210 is not set to the *EQMT-MFR-DATA* state or to an event therein or that access is not authorized, then execution proceeds directly to step 532.

In step 532, a determination is made whether the state register 208 or event register 210 is set to the *REGISTRATION-TERMINATION* state or to an event therein. If it is determined that the register 208 or 210 is set to the *REGISTRATION-TERMINATION* state, then execution enters the *REGISTRATION-TERMINATION* state 406, wherein conventional events, such as providing written notice by the user to the organization operating the bay stations, or by the organization to the user, are submitted to effect termination. Upon completion of events constituting the *REGISTRATION-TERMINATION* state 406, execution of the flow chart 500 for a respective user 111, or 130 terminates. If, in step 532, it is determined that the register 208 is not set to the

REGISTRATION-TERMINATION state, then execution returns to step 502.

FIGURES 6-18 are flow charts of preferred control logic implemented by the network computer 102, bay stations 106, and members 110, instructors 111, and authorized persons 130 for executing messaging and event (e.g., step) sequences between the computers, stations, members, instructors, and authorized persons according to principles of the present invention. It should be noted, however, that in alternative embodiments, the sequencing of events or steps may differ. It should be further noted that references in FIGURES 6-18 to the station 106, members 110, instructors 111, and authorized persons 130 include the respective computers 114, 122, 123, and 131, and that events which transpire between such computers occur through the network 102.

It is understood that, while not described for each state, each state includes, as a preliminary step, the establishment of a data communication connection between the network computer 104 and a computer 114, 122, 123, and/or 131. Such data communication connection is preferably established via the network 102 using a suitable graphical user interface (GUI) standalone software program resident on the computer 114, 122, 123, and/or 131. Alternatively, such data communication connection may be established via the network 102 using any other suitable means, such as a prompt-driven web page interface. Authorization for access to data on the network computer 104 may also be obtained upon submission of member's identification account number 306.

FIGURE 6 is a flow chart which depicts events which transpire during the *DATA-ACQUISITION* state 408. In step 602, after a member makes an appointment to use a bay station 106, the bay station generates a message to retrieve a member's model template data (discussed below). In step 604, the message is transmitted to the network computer 104, preferably at least 24 hours prior to the member's appointment. In step 606, the message is received by the network computer 104 and, in step 608, the requested template data is retrieved from the database 206. In step 610, the data is transmitted to the bay station 106 and, in step 612, the data is received by the computer 114 of the bay station 106 and stored for use by the member at the appointed time.

In step 614, at the time of the member's appointment, the member 110 swipes his/her card with the PIN through the card reader 116 or, alternatively, manually enters his/her PIN into the computer 114, and the computer 114 verifies that the member is the member having the appointment. In step 616, the member executes a repetitive motion, and the input device 118 monitors the motion and generates data describing the motion, in accordance with the co-pending '223 patent application. The input device 118 then transmits the generated data to the computer 114 which then records the data in the computer 114. In step 618, the generated data is processed as desired. For example, the data may be compared against the member's template to generate differences, or deltas, between the member's executed motion and the member's template. In step 620, the processed data are presented to the member, such as via

display on a video screen. In step 622, a determination is made whether the member will execute an additional repetitive motion. If it is determined that the member will execute an additional motion, then execution returns to step 616; otherwise, execution proceeds to step 624. In step 624, upon completion of the member's appointed time, the (preferably unprocessed) data recorded in step 616 is transmitted from bay station 106 via the network 102 to the network computer 104. In step 626, the data is received by the network computer 104 and, in step 628, the network computer 104 records the received data in the database 206.

FIGURE 7 is a flow chart which depicts events which transpire during the *DATA-ACCESS* state 410. In step 702, a user 110, 111, or 130 desirous of accessing (and authorized to access) data describing repetitive motions, utilizes his/her respective computer 122, 123, or 131 in a conventional manner to generate a request message to retrieve such data. The message may also include a request for the member's template data. In step 704, the member's PIN (e.g., account number) 306 is preferably automatically appended to the request message, though the PIN may be manually appended thereto. In step 706, the request message is transmitted via the network 102 to the network computer 104, and in step 708, the network computer receives the message. In step 710, the network computer 104 retrieves the requested data from the database 206. In step 712, the requested data is transmitted from the network computer 104 via the network 102 to the computer 122, 123, or 131 and in step 714, the member computer 122 receives the message. In step 716,

the computer 122, 123, or 131 processes the data (e.g., determines deltas between the member's template and requested motion data) and presents (e.g., displays on a monitor) the data to the user 110, 111, or 130.

5 FIGURE 8 is a flowchart of control logic implemented by the network computer 104 during the *TEMPLATE-DESIGNATION* state 412 (FIG. 4) for identifying a model motion in a station 106, and designating such model motion as a motion template in accordance with principles
10 of the present invention. Accordingly, execution is initiated in step 802, at a station 106, a member's computer 122, an instructor's computer 123, or an authorized person's computer 131 wherein preferably an instructor 111 of a member 110 having a particular member
15 number 306, or alternatively the member him/herself, identifies a repetitive motion executed by the member 110 as a model repetitive motion for the member. In step 804, the identified model motion is designated through the computer 114, 122, 123, or 131 as a model motion
20 template. In step 806, the computer 114, 122, 123, or 131 is directed by the member 110 or instructor 111 to generate a message associating the model motion template with the member 110 having the particular member number 306. In step 808, the message is transmitted via the
25 network 102 to the network computer 104, and in step 810, the message is received by the network computer 104. In step 812, the data associating the model motion template with the member 110 having the particular member number 306 is recorded in the database 206.

30 FIGURE 9 is a flowchart of control logic implemented by the network computer 104 during the *REMOTE-DELTA-*

COMPARE state 414 (FIG. 4) for comparing differences, or deltas, between a member's executed repetitive motion and a member's model motion template, while not at a bay station 106, in accordance with the present invention.

5 Accordingly, in step 902, a user 110, 111, or 130 having a particular PIN 306 and located at a remote terminal, or computer, 122, 123, or 131 accesses the network computer 104 in a conventional manner to generate a message requesting that the network computer 104 retrieve from

10 the database 206 data describing a repetitive motion that the member 110 executed, and data describing the member's model motion template. The repetitive motion may or may not have been executed at the same station 106 that the template was generated from. In step 904, the request

15 message is transmitted via the network 102 to the network computer 104, and in step 906, the message is received by the network computer 104. In step 908, the network computer 104 retrieves from the database 206 data necessary to execute request. In step 910, the network

20 computer 104 generates a response message responding to the request message received in step 906 comprising the requested data. In step 912, the response message is transmitted from the network computer via the network 102 to the computer 122 or 123, and in step 914, the response

25 message is received by the computer 122 or 123. In step 916, the computer 122 or 123 processes the data to compare the executed repetitive motion requested by the member 110 against the member's motion template to determine at least one delta between the motion template

30 and the executed repetitive motion motion of the member 110.

FIGURE 10 is a flowchart of control logic implemented by the network computer 104 during the *FEEDBACK-PROFILE* state 416 (FIG. 4) for entering feedback profiles effective for indicating to the network computer 104 the type of feedback a member should receive after executing a repetitive motion, in accordance with the present invention. Accordingly, in step 1002, a member 110 or an instructor 111 enters into a computer 114, 122, or 123, data indicating the type of feedback a member should receive after executing a repetitive motion. The computer 114, 122, or 123 processes the data to generate a feedback profile for the member, which profile includes the member identification number of the member. By way of example, the feedback profile may indicate whether the member wishes to receive audible feedback, visual feedback, positive feedback, negative feedback, feedback only when doing something incorrectly, feedback only with respect to selected aspects of a repetitive motion, and/or the like. In step 1004, the computer 114, 122, 123, or 131 generates a message comprising the feedback profile of the member. In step 1006, the feedback profile message is transmitted via the network 102 to the network computer 104, and in step 1008, the feedback profile message is received by the network computer 104. In step 1010, the network computer 104 records the feedback profile for providing subsequent feedback to the member identified by the member's identification number.

FIGURE 11 is a flowchart of control logic implemented by the network computer 104 during the *MEMBER-EQMT-RECOMMENDATION* state 428 (FIG. 4) for generating recommendations of equipment that a member 110

should use to improve his/her game, in accordance with one embodiment of the present invention. Accordingly, execution of the program 204 is initiated in step 1102 and, in step 1104, data is compiled from a plurality of members to generate statistical data regarding equipment, including accessories, apparel, and/or balls, used in the execution of the repetitive motions. The statistical data is recorded in the computer memory 202. Such statistical data may include, but is not limited to, the effect of certain brands and models of various equipment for enhancing performance for certain types of members in certain types of circumstances. In step 1106, data from repetitive motions executed by a particular member 110 is compiled and, from the compiled data, statistical data is generated, using conventional methods, in a manner effective for determining what type of equipment would most enhance performance of the particular member 110. In step 1108, the statistical data generated in step 1106 for the particular member 110 is compared against the statistical data generated in step 1104 for the plurality of members using conventional techniques to generate a recommendation of what brand and model of equipment, including accessories, apparel, and balls, would most enhance the repetitive motion performance of the particular member 110. The program 204 is terminated with respect to the *MEMBER-EQMT-RECOMMENDATION* state 418 in step 1110.

FIGURES 12-15 depict competitions that may be held between members 110 who may be diversely located at the same or different bay stations 106. For example, one member at one bay station 106 may compete with other

members at the same or other bay stations located in a same or different city, state, or country.

FIGURE 12 is a flowchart of control logic implemented by the network computer 104 during the *LEAST-DELTA-COMPETITION* state 420 (FIG. 4) for conducting a competition between selected members 110, in accordance with one embodiment of the present invention. Accordingly, the competition is initiated in step 1202 and, in step 1204, a group of members 110 are identified who are interested in competing to determine which member practices a repetitive motion closest to a member's respective model motion template, and their respective member identification numbers are entered into the network computer 104. In step 1206, the network computer 104 retrieves from the database 206, data representing each member's most recently executed repetitive motion, and compares the executed repetitive motion against the member's respective model motion template to determine at least one delta between the executed repetitive motion and the template. While the executed repetitive motion may be selected based on which practice is the most recent, other suitable criteria may used, such as a member's best of a predetermined number (e.g., ten) of the most recently executed repetitive motions, or a member's average executed repetitive motion of a predetermined number (e.g., ten) of the most recently executed repetitive motions, or the like. Alternatively, the deltas may be determined for each of the executed repetitive motions, and the statistical average, mean, or the like, may be determined for the competition. In another alternative, rather than retrieve data

representing past executed repetitive motions, each competing member may be required to execute a repetitive motion for competition at a designated point in time. Upon completion of the comparison and delta determination in step 1206, execution proceeds to step 1208 in which the deltas for each member are compared, and in which the member having the least delta is identified as the winner of the competition to practice closest to the member's respective motion template. In step 1210, a prize, such as recognition, a monetary prize, and/or the like, may optionally be awarded to the winner. In step 1212, the competition is terminated.

FIGURE 13 is a flowchart of control logic implemented by the network computer 104 during the *IMPROVEMENT-COMPETITION* state 422 (FIG. 4) for conducting a competition between selected members 110 to determine which member has improved the most, in accordance with one embodiment of the present invention. Accordingly, the competition is initiated in step 1302 and, in step 1304, a group of members 110 are identified who are interested in competing to determine which member has most improved his/her repetitive motion, and their respective member PINs are entered into the network computer 104. In step 1306, the network computer 104 retrieves from the database 206 for each member 110 in the group, data representing a first delta (i.e., from template) of a member's executed repetitive motion at a first point in time. In step 1308, the network computer 104 retrieves from the database 206 for each member 110 in the group, data representing a second delta of a member's repetitive motion executed at a second,

subsequent, point in time. In step 1310, the decrease from the first delta to the second delta is calculated for each member 110. While the repetitive motions may be selected at two points in time, repetitive motions may be selected from a predetermined number (e.g., ten) points in time, and the improvement, or decrease in deltas, of each member 110 calculated using conventional statistical methods. In step 1312, the deltas of the competing members 110 are compared to identify the member having the greatest decrease as the winner of the competition to determine which member 110 has improved the most. In step 1314, a prize, such as recognition, a monetary prize, and/or the like, may optionally be awarded to the winner. In step 1316, the improvement competition is terminated.

FIGURE 14 is a flowchart of control logic implemented by the network computer 104 during the *CONSISTENCY-COMPETITION* state 424 (FIG. 4) for conducting a competition between selected members 110 to determine which member is the most consistent with his/her repetitive motions, in accordance with one embodiment of the present invention. Accordingly, the competition is initiated in step 1402 and, in step 1404, a group of members 110 are identified who are interested in competing to determine which member practices their repetitive motion most consistently, and their respective member PINs are entered into the network computer 104. In step 1406, the network computer 104 retrieves from the database 206, data from each of a selected plurality of points in time for each member of the group, and compares at least one respective repetitive motion against a

respective motion template to determine at least one
respective delta between the respective motion template
and the respective executed repetitive motion, thereby
establishing a sequence of deltas for each member of the
5 group. In step 1408, the network computer 104 determines
for each member of the group a respective variance of
respective sequence of deltas, using conventional
statistical methods. In step 1410, the member having the
least variance is identified as the most consistent
10 practicing member of the plurality of members. In step
1412, a prize, such as recognition, a monetary prize,
and/or the like, may optionally be awarded to the winner.
In step 1414, the improvement competition is terminated.

FIGURE 15 is a flowchart of control logic
15 implemented by the network computer 104 during the
VIRTUAL-COMPETITION state 426 (FIG. 4) for conducting a
virtual competition between selected members 110, in
accordance with one embodiment of the present invention.
Accordingly, the competition is initiated in step 1502
20 and, in step 1504, a group of members 110 are identified
who are interested in competing to determine which member
practices a repetitive motion with the best performance
results (e.g., which member hits a golf ball the furthest
and/or most accurately), and their respective member PINs
25 are entered into the network computer 104. In step 1506,
the network computer 104 retrieves from the database 206
for each member 110, data representing a member's most
recently executed repetitive motion and the performance
results of the repetitive motion. While the repetitive
30 motion may be selected based on which practice is the
most recent, other suitable criteria may used, such as a

member's best of a predetermined number (e.g., ten) of the most recently executed repetitive motions, or a member's average repetitive motion performance of a predetermined number (e.g., ten) of the most recently
5 executed repetitive motions, or the like. Alternatively, rather than retrieve data representing past executed repetitive motions, each competing member may be required to execute a repetitive motion for competition sequentially or in real time, e.g., during a
10 predetermined period of time, such as within a specified 24 hour period. The execution of the repetitive motions may be made against an electronically simulated overlay of a real environment in which such motion would typically be made. For example, in the case of
15 repetitive motions such as golf swings, the execution of the repetitive motions may be made against an overlay of an actual or simulated golf course. Upon obtaining the performance results in step 1506, execution proceeds to step 1508 in which the performance results for each
20 member are compared, one against the other. In step 1510, the member having the best performance results is identified as the winner of the virtual competition. In determining the best performance results, handicaps may also be considered and accounted for. In step 1512, a
25 prize, such as recognition, a monetary prize, and/or the like, may optionally be awarded to the winner. In step 1514, the virtual competition is terminated.

FIGURE 16 is a flowchart of control logic implemented by the network computer 104 during a first of
30 two INSTRUCTOR-DATA states 428 (FIG. 4) for enabling an instructor 111 of one or more members to review past

repetitive motions executed by the one or more members, in accordance with one embodiment of the present invention. Accordingly, the control logic is initiated at step 1602, which may result from the instructor 111
5 accessing the network computer 104 via the computer 123 or 114. In step 1604, data, including 3D models and/or video data, generated over a period of time (e.g., since a respective member's last training lesson with the instructor), preferably selected by the instructor, is
10 retrieved from the database 206. In step 1606, the data is processed to generate statistical data, using conventional methods, in a form that is effective for an instructor 111 of the one or more members 110 to analyze how well each member is developing his/her repetitive
15 motion. In step 1608, the statistical data, along with 3D models and/or video data, is presented to the instructor 111 to assist the instructor 111 in analyzing the member's progress since a last training lesson, and to aid the instructor 111 in knowing what to emphasize in
20 a next training lesson. In step 1610, the first of two instructor states is terminated.

FIGURE 17 is a flowchart of control logic implemented by the network computer 104 during a second of two *INSTRUCTOR-DATA* states 428 (FIG. 4) for
25 determining how to compensate an instructor 111, in accordance with one embodiment of the present invention. Accordingly, the control logic is initiated at step 1702, which may result from the instructor 111 accessing the network computer 104 via the computer 123 or 114. In
30 step 1704, a determination is made of the number of times all members 110 instructed by an instructor 111 have

practiced their repetitive motions since a selected time. By way of example, such selected time may be designated as the last time each respective member 110 received a lesson from the instructor 111, or the last time the instructor was compensated, or the like. In step 1706, a compensation amount is determined for the instructor based on the number of practices calculated in step 1704. Such calculation may be based on a fixed amount of compensation per practice, a varying amount per practice depending on how many practices were executed, or the like. The compensation may be in the form of monetary funds, credits that may be applied toward purchases, or the like. The program 204 is terminated with respect to the *INSTRUCTOR-DATA* state 428 in step 1708.

FIGURE 18 is a flowchart of control logic implemented by the network computer 104 during the *EQMT-MFR-DATA* state 430 (FIG. 4) for generating data useful to manufacturers for enhancing the effectiveness of repetitive motion equipment, apparatuses, and/or clothes they manufacture, in accordance with one embodiment of the present invention. Accordingly, the control logic is initiated at step 1802, which may result from an authorized person, which may optionally include the manufacturer, accessing the network computer 104 via the network 102. In step 1804, data is compiled from a plurality of members to generate statistical data regarding equipment, including accessories, apparel, and/or balls, used in the execution of the repetitive motions. In step 1806, the statistical data is recorded in the computer memory 202. Such statistical data may include, but is not limited to, the effect of certain

brands and models of various equipment for enhancing performance for certain types of members in certain types of circumstances.

In step 1808, a determination is made whether a particular manufacturer has compensated (e.g., in monetary funds) the organization operating the network computer 104 for statistical data. If it is determined that a particular manufacturer has compensated the organization for statistical data, then execution proceeds to step 1810, wherein the statistical data is provided to the particular manufacturer; otherwise, execution proceeds to step 1812.

In step 1812, a determination is made whether a particular manufacturer has compensated (e.g., in monetary funds) the organization operating the network computer 104 for including the particular manufacturer as a brand to recommend in step 1108 or FIG. 11. If it is determined that a particular manufacturer has so compensated the organization, then execution proceeds to step 1814, wherein the particular manufacturer's brand is registered as a brand to recommend; otherwise, execution proceeds to step 1816, wherein execution is terminated. Upon completion of step 1814, execution proceeds to step 1816.

Any compensation received from manufacturers may optionally be distributed to the bay stations 106. Such optional distribution may be based upon any agreed-upon type of distribution, such as an equal portion of monetary funds to each station 106, or a portion of the monetary funds may be distributed to each station based on the number of members that use each station, or the

number of repetitive motions executed at each station 106.

By the use of the present invention, individuals may develop and improve repetitive motion sequences much more efficiently than is possible using conventional techniques. The method of the present invention also permits individuals to review their progress at any location where they are able to connect to the network, (such as the Internet), and to compete with other individuals in remote locations without traveling. The structure of the present invention also enables stations to benefit financially, and for equipment manufacturers to improve their products, in ways not possible using conventional techniques.

It is understood that the present invention may take many forms and embodiments. Accordingly, several variations may be made in the foregoing without departing from the spirit or the scope of the invention. For example, with respect to a game of golf, a video screen may be provided in a bay station 106 which would display a virtual golf course simulating a real golf course selected from anywhere in the world. Using the data generated at the bay station 106, the computer 114 could simulate the path a golf ball over the topography of the course, and overlay the path of the ball over the golf course on the screen. Such virtual overlay could be used in competition also. In an example relating to competitions, a web page may be provided comprising a leader board identifying the standing of each member 110 participating in a competition conducted in accordance

with the present invention, such as depicted in FIGS. 12-15).

Having thus described the present invention by reference to certain of its preferred embodiments, it is noted that the embodiments disclosed are illustrative rather than limiting in nature and that a wide range of variations, modifications, changes, and substitutions are contemplated in the foregoing disclosure and, in some instances, some features of the present invention may be employed without a corresponding use of the other features. Many such variations and modifications may be considered obvious and desirable by those skilled in the art based upon a review of the foregoing description of preferred embodiments. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.